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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S,FE) Examination January 2023 (2015 scheme)

Course Code: CS361

Course Name: SOFT COMPUTING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks. Marks

1 Differentiate between the problem solving strategies: Soft computing and Hard computing. (3)

2 What is the role of activation function in Artificial Neural Network (ANN)? Write and explain any two activation functions of ANN. (3)

3 Draw the architecture of Adaline Network. What is the training rule for Adaline network? (3)

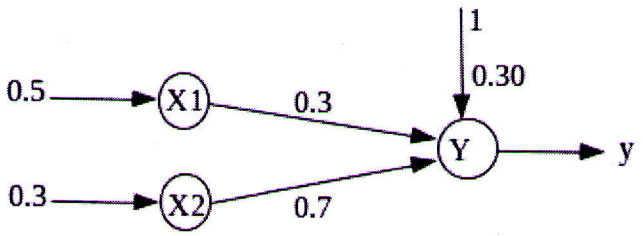
4 Explain the training algorithm of Perceptron network. (3)

PART B

Answer any two full questions, each carries 9 marks.

5 a) Implement AND function using Mc Culloch-Pitts neuron. Use binary data. (6)

b) Calculate the net input to the neuron Y for the network shown in figure. (3)



6 a) Explain the five basic architectures of ANN based on connection. (5)

b) Draw and explain the architecture of Back Propagation Network. (4)

7 Implement the logic function OR with binary inputs and bipolar targets using perceptron network up to two epochs. (9)

PART C

Answer all questions, each carries 3 marks.

8 Explain the concept of set membership in Fuzzy Logic. Illustrate it with an example. (3)

9 What is Fuzzy equivalence relation? Explain. (3)

10 What are the features of fuzzy membership function? Explain. (3)

11 For the discrete fuzzy set A, defined on universe X = {a, b, c, d, e, f } find λ-cut sets for the values of λ = 1, 0.7 and 0 (3)

$$\underline{A} = \left\{ \frac{1}{a} + \frac{0.8}{b} + \frac{0.7}{c} + \frac{0.4}{d} + \frac{0.2}{e} + \frac{0}{f} \right\}$$

PART D

Answer any two full questions, each carries 9 marks.

12 a) Perform union, intersection, complement and difference over the given fuzzy sets A and B : (6)

$$\underline{A} = \left\{ \frac{1}{3} + \frac{0.3}{5} + \frac{0.4}{7} + \frac{0.2}{9} \right\}$$

$$\underline{B} = \left\{ \frac{.5}{3} + \frac{0.4}{5} + \frac{0.1}{7} + \frac{1}{9} \right\}$$

b) Find the Fuzzy Cartesian product of following fuzzy sets A and B : (3)

$$\underline{A} = \left\{ \frac{.2}{x_1} + \frac{0.5}{x_2} + \frac{1}{x_3} \right\}$$

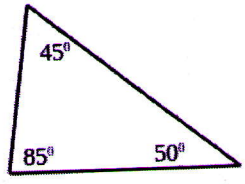
$$\underline{B} = \left\{ \frac{.1}{y_1} + \frac{0.7}{y_2} \right\}$$

13 a) Compute Max Min composition of the two fuzzy relations R and S. (5)

$$\underline{R} = \begin{bmatrix} .4 & .3 \\ .2 & .8 \end{bmatrix}$$

$$\underline{S} = \begin{bmatrix} 1 & .2 & .3 \\ .5 & .4 & .7 \end{bmatrix}$$

b) Consider the given fuzzy triangle. Infer membership values for it in triangle types Isosceles and Equilateral. (4)



14 What is defuzzification? Explain any six defuzzification methods. (9)

PART E

Answer any four full questions, each carries 10 marks.

15	a)	What all can be used in fuzzy proposition to extend the reasoning capability of fuzzy logic? Explain.	(5.5)
	b)	Define the terms Linguistic Variable, Linguistic Hedge and Fuzzy Logic Proposition. Give one example for each.	(4.5)
16	a)	Explain the techniques for decomposition of compound linguistic rules.	(6)
	b)	Explain the techniques for aggregation of fuzzy rules.	(4)
17	a)	Draw the block diagram of Fuzzy Inference System and explain its working principle.	(5)
	b)	What are the different types of Neuro Fuzzy Hybrid systems? Explain.	(5)
18	a)	What is Genetic Algorithm? Draw the flow chart of Genetic Algorithm and explain the steps involved.	(6)
	b)	Explain any four encoding operators of Genetic Algorithm with example.	(4)
19		What is the role of selection process in Genetic Algorithm? Explain any five selection techniques.	(10)
20	a)	Draw the block diagram of Genetic Neuro Hybrid systems and explain its properties.	(5)
	b)	Draw and Explain Genetic Fuzzy Rule Based system architecture.	(5)

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